

WHAT IS CLAIMED IS:

1. An image processing apparatus for processing color images, comprising:

5 a feature amount calculation section for calculating a feature amount with respect to a pixel of interest;

10 a background sensing section for sensing a background density or a background color with respect to a region surrounding the pixel of interest whose feature amount is calculated by the feature amount calculation section;

15 a plurality of character determination sections for determining whether the pixel of interest corresponds to a character or a line drawing on the basis of the feature amount calculated by the feature amount calculation section, said plurality of character determination sections using mutually different determination methods; and

20 a character determination selector section for selecting one of determination results output from the character determination sections in accordance with a sensing result output from the background sensing section.

25 2. An image processing apparatus according to claim 1, wherein different reference values are set to said character determination sections, and each of said character determination sections compares a reference

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value assigned thereto with the feature amount calculated by the feature amount calculation section, thereby determining whether the pixel of interest corresponds to the character or the line drawing.

5 3. An image processing apparatus according to claim 1, wherein said feature amount calculation section calculates a feature amount of the pixel of interest by using a first region defined surrounding the pixel of interest, and said background sensing
10 section senses a background density or a background color regarding a region surrounding the pixel of interest by using a second region which is similar in size to the first region or greater than the first region.

15 4. An image processing apparatus according to claim 1, wherein said background sensing section senses the background density or background color by using only those pixels which the determination result selected by the character determination selector
20 section regards as an object other than the character or line drawing.

 5. An image processing apparatus according to claim 1, wherein said feature amount calculation section calculates the feature amount on the basis of
25 density gradients or distances in a color space between pixels detected in different directions with respect to a predetermined region surrounding the pixel of

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interest.

6. An image processing apparatus according to claim 1, wherein said background sensing section prepares a histogram regarding a density detected in a predetermined region surrounding the pixel of interest, and determines that a sensed density is a background density when the sensed density is within a range that is lower than a predetermined value, and when the sensed density repeatedly appears more than a predetermined number of times and the number of times the sensed density appears is largest.

7. An image processing apparatus according to claim 1, wherein:

when the background sensing section fails to detect the background density or background color of a character, the background sensing section outputs a sensing result signal indicating that a background sensing operation results in failure;

said plurality of character determination sections include at least one character determination section that determines whether the pixel of interest represents a character or a line drawing by using a determination method suited to a case where the background density or the background color cannot be detected; and

when said character determination selector section receives from the background sensing section the signal

indicating that the background sensing operation results in failure, said character determination selector section selects a determination result output from said at least one character determination section, which determines whether the pixel of interest represents a character or a line drawing by using a determination method suited to a case where the background density or the background color cannot be detected.

8. An image processing apparatus according to claim 1, wherein:

said background sensing section senses whether the background of a character is white or a color other than white;

said plurality of character determination sections include a character determination section for determining whether a pixel represents a character or a line drawing by using a determination method suited to a case where the background is white, and a character determination section for determining whether a pixel represents a character or a line drawing by using a determination method suited to a case where the background is other than white; and

said character determination selector section selects a determination result output from the character determination section that determines whether a pixel represents a character or a line drawing by

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a feature amount selection section for selecting one of calculation results output from the feature

amount calculation sections in accordance with a sensing result output from the background sensing section; and

5 a character determination section for determining whether the pixel of interest is a character or a line drawing on the basis of a feature amount selected by the feature amount selection section.

11. An image processing apparatus according to claim 10, wherein said feature amount calculation
10 section calculates a feature amount of the pixel of interest by using a first region defined surrounding the pixel of interest, and said background sensing section senses a background density or a background color regarding a region surrounding the pixel of
15 interest by using a second region which is similar in size to the first region or greater than the first region.

12. An image processing apparatus according to claim 10, wherein said background sensing section
20 senses the background density or background color by using only those pixels which the determination result selected by the character determination selector section regards as an object other than the character or line drawing.

25 13. An image processing apparatus according to claim 10, wherein said plurality of feature amount calculation sections include at least one feature

background color cannot be detected; and

said feature amount selection section selects a calculation result output from the feature amount calculation section that is included among said plurality of feature amount calculation sections and that calculates the feature amount of the pixel of interest by using the calculation method suited to the case where the background density or the background color cannot be detected.

16. An image processing apparatus according to claim 10, wherein:

said background sensing section senses whether the background of a character is white or a color other than white;

said plurality of feature amount calculation sections include a feature amount calculation section for calculating the feature amount of the pixel of interest by using a calculation method suited to a case where the background is white, and a feature amount calculation section for calculating the feature amount of the pixel of interest by using a calculation method suited to a case where the background is other than white; and

said feature amount selection section selects a calculation result output from the feature amount calculation section for calculating the feature amount of the pixel of interest by using the calculation

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method suited to the case where the background is white, when the background of the character is sensed as being white by the background sensing section, and selects a calculation result output from the feature amount calculation section for calculating the feature amount of the pixel of interest by using the calculation method suited to the case where the background is other than white, when the background of the character is sensed as being other than white by the background sensing section.

17. An image processing apparatus according to claim 10, wherein said background sensing section is a low-pass filter, and said feature amount calculation section is a high-pass filter.

18. An image processing apparatus for processing color images, comprising:

a feature amount calculation section for calculating a feature amount with respect to a pixel of interest;

a background sensing section for sensing a background density or a background color with respect to a region surrounding the pixel of interest;

a plurality of color determination sections for determining colors with respect to the pixel of interest on the basis of a chroma and/or a hue thereof, said color determination sections using mutually different determination methods; and

a color determination selector section for selecting one of determination results output from the color determination sections in accordance with the feature amount the feature amount calculation section determines with respect to the pixel of interest or the background density or color the background sensing section senses.

19. An image processing apparatus according to claim 18, wherein different reference values are set to said color determination sections, and each of said color determination sections compares a reference value assigned thereto with the chroma and hue of the pixel of interest, thereby determining the color of the pixel of interest.

20. An image processing apparatus according to claim 18, wherein said plurality of color determination sections includes at least one color determination section that compares a chroma and/or a hue of a highest-density pixel of a predetermined region surrounding the pixel of interest with reference values, thereby determining the color of the pixel of interest.

21. An image processing apparatus according to claim 18, wherein said feature amount calculation section calculates the feature amount on the basis of density gradients or distances in a color space between pixels detected in different directions with respect to a predetermined region surrounding the pixel of

interest.

22. An image processing apparatus according to claim 18, wherein said background sensing section prepares a histogram regarding a density detected in a predetermined region surrounding the pixel of interest, and determines that a sensed density is a background density when the sensed density is within a range that is lower than a predetermined value, and when the sensed density repeatedly appears more than a predetermined number of times and the number of times the sensed density appears is largest.

23. An image processing apparatus according to claim 18, wherein:

when the background sensing section fails to detect the background density or background color of a character, the background sensing section outputs a sensing result signal indicating that a background sensing operation results in failure;

said plurality of color determination sections includes at least one color determination section that determines the color of the pixel of interest by using a determination method suited to a case where the background density or the background color cannot be detected; and

said color determination selector selects a determination result output from the color determination section that is included among said

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plurality of color determination sections and that determines the color of the pixel of interest by using the determination method suited to the case where the background density or the background color cannot be detected, when said color determination selector section receives from the background sensing section the signal indicating that the background sensing operation results in failure.

24. An image processing apparatus according to claim 18, wherein:

said background sensing section senses whether the background of a character is white or a color other than white;

said plurality of color determination sections include a color determination section for determining the color of the pixel of interest by using a determination method suited to a case where the background is white, and a color determination section for determining the color of the pixel of interest by using a determination method suited to a case where the background is other than white; and

said character determination selector section selects a determination result output from the color determination section for determining the color of the pixel of interest by using the determination method suited to the case where the background is white, when the background of the character is sensed as being

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white by the background sensing section, and selects a determination result output from the color determination section for determining the color of the pixel of interest by using the determination method suited to the case where the background is other than white, when the background of the character is sensed as being other than white by the background sensing section.

25. An image processing apparatus according to claim 18, wherein said background sensing section is a low-pass filter, and said feature amount calculation section is a high-pass filter.

26. An image processing apparatus for processing color images, comprising:

a feature amount calculation section for calculating a feature amount with respect to a pixel of interest;

a character determination section for determining whether the pixel of interest is a character or a line drawing on the basis of a feature amount calculated by the feature amount selection section; and

a color determination section for determining the color of the pixel of interest by comparing a chroma and/or a hue of a highest-density pixel of a predetermined region surrounding the pixel of interest with reference values.